

Electromagnetic interference of mobile phones: insight into heart rate variability

To the Editor,

We read with great interest the recent article by Ekici et al. (1) entitled "The effects of the duration of mobile phone use on heart rate variability parameters in healthy subjects" published in *Anatol J Cardiol* 2016; 16: 833-8, documenting the role of mobile phone (MP) use in healthy subjects. Although it is an original concept, we want to address some points that merit more attention.

The rate at which energy is absorbed by the human body is measured by the specific absorption rate (SAR). As authors mentioned in the limitations section, the SAR values were not analyzed. Therefore, the statistical analyses could be affected by different MP models used in this study. Moreover, MP is a potential source of electromagnetic field (EMF) that can affect the reliability of medical devices. The electromagnetic interference (EMI) on medical devices by MP depends on various factors, including power emitted by MP, the frequency of operation, the distance between MP and the medical device, mode of operation of MP, and the immunity of the medical device concerned (2).

Furthermore, there is compelling evidence that MPs may produce EMI that adversely affects the operation of ECG systems and may lead to the inability to properly interpret ECG results (3). Ekici et al. (1) used 24-h Holter ECG records to evaluate the heart rate variability (HRV). HRV is commonly defined by the standard deviation of intervals between successive R waves of the cardiac cycle. The distance between the medical device and MP during ECG recording of the patient alters the QRS complexes (4). The data are presumably uncorrected for type and proximity of MP. Thus, it is extremely difficult to evaluate the results without any interference on Holter monitoring due to MPs.

On the other hand, some users of mobile handsets have reported feeling several unspecific symptoms during and after its use, such as fatigue, headaches, tachycardia, etc. All these symptoms can also be attributed to stress and that current knowledge cannot separate the symptoms from nocebo effects. Moreover, cardiac-vagal spectral component of HRV may be sensitive to the recent experience of emotional stress (5). Increased environmental stress can make people use their MPs more often than usual and increased number of telephone calls can also cause stress. Therefore, it is difficult to isolate the leading cause of HRV differentiation in the study.

Nowadays, MPs are being used not only for calling but also for other services, such as text messaging, email, internet access, video communication, gaming, listening to music, photo-

graphy, and watching movies, etc. At the same time, MP emits a peak amount of power not only during the ringing phase but also during its standby mode (4). Calculation formula for daily durations of MP use only exists duration/number of telephone calls in the manuscript (1). Therefore, this calculation cannot reflect the EMF exposure in this study population.

Overall, it is an uneasy piece of work that performing this type original clinical research is extremely challenging. Data could be interrupted by several interfering environmental electromagnetic pollution these days. Further randomized studies are recommended with more clear protocols.

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